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ABSTRACT

Five distinct format categories are used in this study to describe the form of educational objectives: clarity, range, level of abstractness, behavioralness, and observability. These form concepts are used to describe paradigm statements of three kinds of educational objectives: goals, intended learning outcomes, and behavioral evidence. Goals are defined as the attributes a pupil should possess on completion of an educational experience; intended learning outcomes are those learnings a pupil should accomplish as part of an educational experience; and behavioral evidence statements contribute to operational clarity and are used to assess the achievement of goals or intended learning outcomes. These concepts are congruent with a process/product model of educational development, which leaves the decision as to the precise form of an educational objective to the educational planner in each context. The paradigm statements themselves may be used as a reference for analyzing or constructing a set of educational objectives. (Author/JG)

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Paradigm Statements of Educational Objectives

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SECTION 1

INTRODUCTION

The question underlying this study concerns the characteristics that an educational objective should have in order to serve a given purpose in educational planning. This question is basically one of form and function. However, very little can be done in regard to building a framework within which to analyze or construct a set of educational objectives until the concepts which define form and function are explicated in detail. The purpose of this paper is to present paradigm statements of educational objectives which illustrate the important concepts related to a statement's form and function. Here educational objectives are those statements which describe the student related intents of an educational endeavor. They do not refer to intended teaching practices, personnel organization, or other administrative concerns.

This paper is divided into four sections. The first section is this brief introduction. Section 2 is a discussion of the form and function concepts used in this study. In section 3 paradigm statements are presented and discussed using the form and function concepts. Finally, in section 4 the conclusions drawn and their implications are considered.

SECTION 2

FUNCTION AND FORM

The Function of Educational Objectives

If may be noted that, traditionally the function of an objective has been separated into three categories (1) direction or guidance (2) selection of learning experiences and (3) evaluation (Langley, 1974). However, the use of a process/product model such as Johnson's (1967) to describe educational development suggests that a more appropriate description of an objective's function is that it directs or guides the selection of learning experiences or evaluation. That is, educational objectives may be thought of as products, concepts such as direction and guidance may be thought of as describing their functions, and such actions as selection of learning experiences and evaluation may be seen as processes. Further as products, educational objectives have two kinds of functions: input and output. As input they guide or direct processes. As output they have the function of communicating to those inside and outside of the educational community, the intents or achievements of the process from which they result.

In this study there are three educational products that are of utmost concern. They are the educational

objectives called goals, intended learning outcomes, and behavioral evidence. Each of these products is related to two or more processes as output or input. Following are the relevant processes: the selection of goals or goal setting, the selection of curriculum items or curriculum development, the selection of learning experience or instructional planning, and the selection of evaluation procedures or evaluation planning.

References in the literature do little to differentiate goals from intended learning outcomes except that goals are usually considered to be more "general". This is really not precise enough. In fact the term "goal" has often been used synonymously with the term "objective" which is used here to name all three types of statements. In order then to clearly differentiate goals from the other two types of objective, and in keeping with the description of goals found in the literature as "the end products of education" (Krathwohl and Payne, 1971, p. 21), the following definition for a goal has been stipulated: a goal is an educational objective which describes the attributes that a pupil should have at the completion of an educational experience. Goals are the output of the goal setting process and input for both the curriculum development and evaluation planning processes.

Based on Johnson, 1967, and Posner and Strike, 1975, in this study, intended learning outcomes are defined as those objectives which describe the learnings a pupil should accomplish as a result of an educational experience.

Intended learning outcomes are output of the curriculum development process and input for both the instructional planning and evaluation processes.

The differences between intended learning outcomes and behavioral evidence can be easily described since their respective definitions have been clearly stated elsewhere (Johnson, 1967; Posner and Strike, 1975). Therefore, behavioral evidence is here defined as those objectives which describe what one should look for in order to assess the achievement of goals or intended learning outcomes. Behavioral evidence is output of the initial stage of evaluation planning and input for later evaluation planning processes.

The function of an objective differs depending on whether it is input or output. For example, as a product or output of the curriculum development process, intended learning outcomes have the function of communicating the desired pupil learnings to be achieved as part of an educational effort. As input to the evaluation planning process, these objectives have the function of directing the selection of behavioral evidence with which to verify their achievement. As input for the instructional planning process, intended learning outcomes have the function of guiding the selection of learning experiences (i.e., instructional activities, materials, content, etc.) which will result in an instructional plan.

There are a number of other products and processes that should be mentioned in order to provide a complete picture of educational development. First, there are values or a rationale which are input for the goal setting process. Of course, the output of the instructional planning process is an instructional plan, and an evaluation plan is the output of evaluation planning. The instructional plan is input for instruction itself. The output of instruction may be called actual learning outcomes. The evaluation plan provides guidance for observing actual learning outcomes and for making judgments about them. The outcomes of these processes, observing and judging, are data and decisions, respectively. Decisions may provide new input for ones rationale and so the entire developmental effort begins again. Figure 1 illustrates this process/product model.

Once the functions of an objective have been described, the next task is to clearly define the concepts to be used in discussing an objective's form.

The Form of Educational Objectives

In this study form concepts are used in reference to the two essential aspects of an objective, namely, its very and object. In addition, it is the author's point of view that the traditional general to specific behavioral continuum which has been used in the past

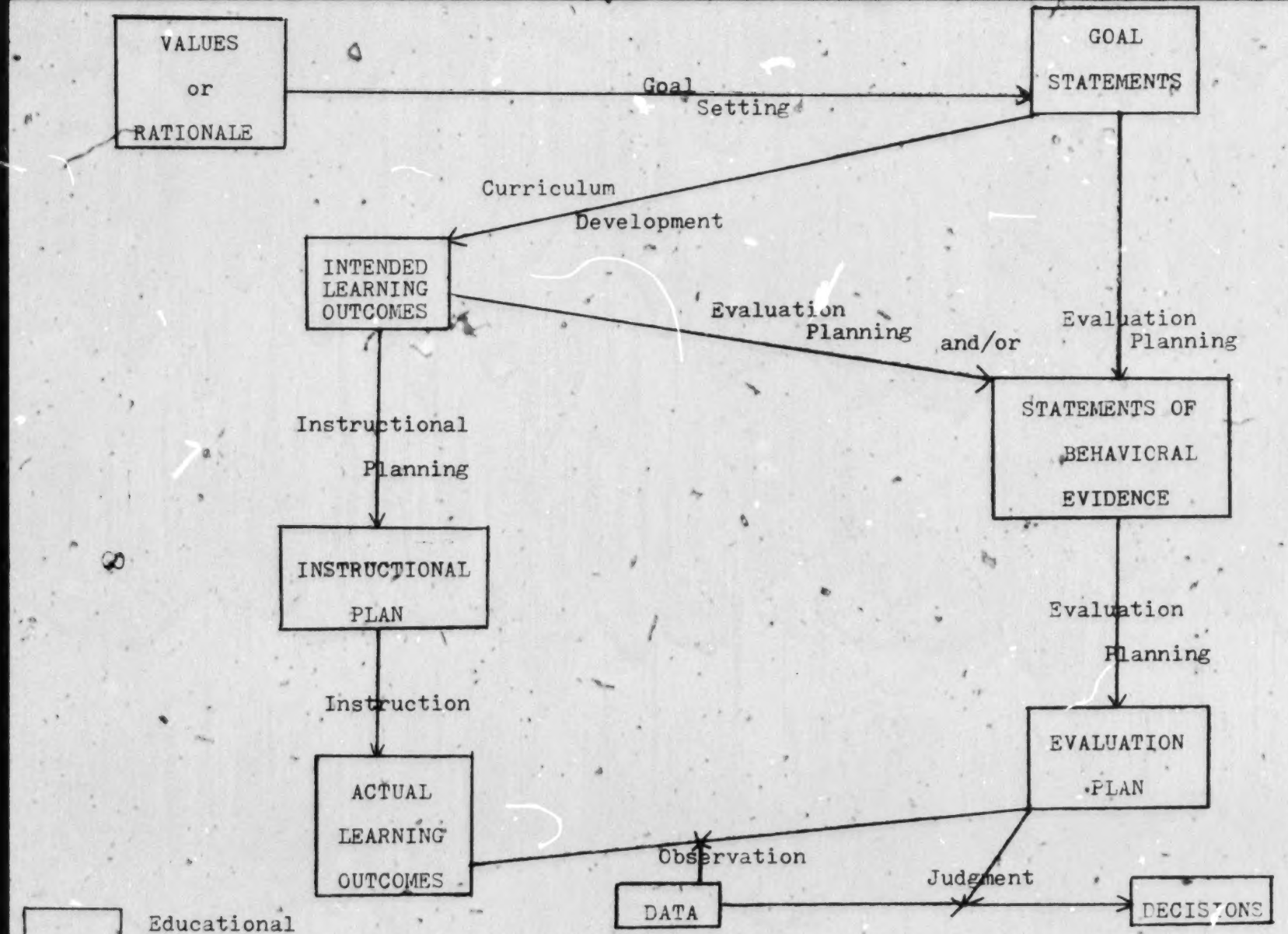

Figure 1. A process/product model of educational development.

to describe an objective's form is not comprehensive enough.

The form of an educational objective is most comprehensively described by using format categories such as those developed by Strike and Posner (1974). The format categories used in this study were derived from these categories. Using precise concepts to describe a statement's verb and object made it possible to differentiate between objectives within the same domain of learning which refer to the same content area.

There are five distinct format categories that were used in this study to describe an objective's form.

The first category is concerned with clarity. This category includes three related concepts. One is the notion of vagueness which describes a concept (i.e., a verb or object) with indeterminant conceptual boundaries. Another is conceptual clarity in which the meaning of a concept is made clear. The last is operational clarity which allows one to identify the presence of a concept.

The second format category centers around range or the number of instances covered by the concepts, the verb and object, in an objective. The third focuses on the level of abstractness from particulars of an objective's verb or object. The fourth category is "behavioralness." At one end of the "behavioralness" continuum are states of being and at the other end are actions or movements. This category

is used primarily to describe an objective's verb. The fifth and last category, observability, describes whether or not a pupil's accomplishment of an objective can be viewed directly and is also used primarily in reference to an objective's verb. All five categories may be pictured as continuua.

Clarity. - The major category that will help differentiate among statements of educational objectives is clarity. The sub-concepts that represent the positions on the clarity continuum are vagueness, conceptual clarity, and operational clarity. Figure 2 presents the clarity continuum.

Vagueness	Conceptual Clarity	Operational Clarity
Indeterminant conceptual boundary	Clarity of meaning	An unambiguously stated, observable behavior

Figure 2. Clarity continuum.

The notion of clarity is illuminated by analyzing the following objectives: "the pupil values neatness," "the pupil is inclined to have an orderly work area," and "the pupil washes his/her desk." The verb "to value" is relatively vague; it has a more indeterminant conceptual boundary than "to be inclined" or "to wash." Conversely, "to be inclined" is more conceptually clear than "to value" because there is less question about its meaning. The verb "to wash" is not

only more conceptually clear than the other two, since we are very sure of its meaning, but it is also operational because it describes an observable behavior. In fact, "to wash" is operationally clear, because we can observe its accomplishment directly without ambiguity.

Clarity may also refer to a statement's object. For example, "neatness" is a rather vague concept. "An orderly work area" is more conceptually clear than "neatness" but not quite as clear as "desk" because there is more uncertainty about the meaning of "work area" than about "desk." The notion of operational clarity is not as useful when talking about a statement's object as is the notion of concreteness (i.e., level specificity), the opposite of abstractness. In order for a statement as a whole to be conceptually clear, both its verb and object must exhibit conceptual clarity. On the other hand, in order for a statement as a whole to be operationally clear, the statement's verb must exhibit operational clarity and its object must exhibit conceptual clarity.

Conceptual clarity is attained through the generation of a formula definition[1] for a concept. Therefore, it is

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[1]Formula Definition - a statement or group of statements which clarify the meaning of a term by specifying the essential components or properties of the term (Strike and Posner, 1974).

important to remember that "to be inclined" is not the same as "to value," but that in this case it is part of the formula definition that describes the meaning of "to value." Similarly, "to wash" is but one of the set of observable referents in the operational definition[2] of "to value" or "to be inclined to." That is, it is one manifestation of these concepts.

At this point it is possible to talk about an objective as a whole. That is, the objective "the pupil values neatness" is a vague statement since both its verb ("to value") and its object ("neatness") are vague concepts. The objective "the pupil is inclined to have an orderly work area" is but one part of the formula definition for that more vague statement and as such it has, relatively speaking, a more conceptually clear verb and object. The objective "the pupil washes his/her desk" may or may not be more conceptually clear than "the pupil is inclined to have an orderly work area" but it is more operationally clear and may, therefore, form a part of that objective's operational definition. "The pupil washes his/her desk" may be called operationally clear since its verb is operationally clear and its object is conceptually clear.

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[2]Operational Definition - a statement or group of statements which link the term to be defined with some test or observation by which that term may be identified (Strike and Posner, 1974).

A vague objective's formula and operational definitions will be made up of many statements. Therefore, one should be most cautious about accepting any single or even a small number of statements as the definitive rendition of the meaning or evidence for such an objective. The remainder of the format categories help to illuminate other characteristics of verbs and objects which are useful in differentiating one objective from another.

Range. - The format category range is a modification of the general-to-specific continuum traditionally used to describe an objective's form as a whole. In this study, an objective's form is discussed separately for the concepts embodied in its verb and object. At one end of the range continuum fall range-general concepts, i.e., those that cover many instances. As one approaches the range-specific end of this continuum, concepts which cover fewer and fewer instances are found. Figure 3 pictures the range continuum.

Range-general — Range-specific

many instances covered	fewer instances covered	one instance covered

Figure 3. Range continuum.

The format category range may be used when talking about a statement's object. Mathematics is an example of

a range-general object found in statements of educational objectives. Mathematics subsumes many other concepts, such as addition, subtraction, set theory, whole numbers, geometry, algebra, all of which cover fewer instances. Therefore, it may be said, for example, that geometry, addition, and whole numbers are more range-specific than mathematics. It should be noted that these more range-specific concepts are also the ones included in the formula definition of the concept mathematics. By isolating the concepts that are subsumed by a range-general concept, the components of its formula definition are illuminated.

The components of some verb's formula definition may be discussed in terms of their relative range-generality or specificity. One example is the verb "to move" and its components. This verb subsumes other verbs such as "to jump," "to run," "to hop," "to gesture." These verbs all cover fewer instances than the range-general verb "to move." As with range-general objects, these more range-specific verbs also help to define the verb "to move." Both the verb and object of an operationally clear statement are range-specific.

Level. - The level format category is also a modification of the traditional general-to-specific continuum. At the level-general end of this continuum are found abstract concepts, that is, those that are remote from particulars. At the level-specific end of the continuum are concepts

which are concrete, i.e., particulars. Figure 4 shows the level continuum.

Level-general	Level-specific
abstract, removed from particulars	concrete, particulars

Figure 4. Level continuum.

The format category termed level of abstractness describes verbs like the following as level-general: "to communicate," "to perceive," and "to comprehend." In contrast, "to explain" or "to give examples" are both more level-specific than "to communicate;" "to track visually" or "to distinguish by touch" are both more level-specific than "to perceive;" and "to translate" is more level-specific than "to comprehend." In regard to a statement's object, a concept like "botany" is much more level-general or abstract than "an oak tree." This is the case because botany, as a concept, is quite far removed from particulars such as an oak tree.

Level of abstractness should be considered separately from the relative conceptual clarity of related concepts, since a concept which is more conceptually clear may or may not be less level-general than the one whose meaning it is intended to clarify. This is the case for both a statement's verb and object.

In general when comparing two verbs, if one verb, for example "to value", is simply intended to provide conceptual

clarification for another verb (e.g., "to appreciate"), there will be no difference in their level of abstractness. Another example might be the comparison between the verb "to know" and the verbs which make up its formula definition (e.g., "to be aware of," "to know that," and "to understand"). However, if a verb such as "to understand" is compared with a verb like "to translate," which may be intended to help operationally define it, then it may be said that "to translate" is more concrete (i.e., more level-specific) than "to understand" since it is more closely associated with a particular action.

The same comparison may be made among objects. For example, in comparison to "natural phenomena" the concept "evolution" may be judged to be more conceptually clear since its meaning is less vague. It may, therefore, be used as part of the formula definition of the concept "natural phenomena". However, "evolution" as a concept is not any less abstract since it is no more closely related to particulars.

To summarize then, a verb and object's level of abstractness may be independent of their conceptual clarity. However, a verb's level of abstractness and operational clarity are related. The verbs which are part of the operational definition of an abstract verb are less abstract. That is, they are closer to particulars since they must provide the test by which the verb may be identified. In

addition, the level of abstractness of a statement's object and the operational clarity of the statement as a whole are related; operationally clear statements have objects that are closely related to particulars.

The question may be asked "how are the categories of range and level related?" For many objects, as the concepts they embody become more range-specific through formula definition, they will also become more level-specific, although this is not always the case as was pointed out above. To give an example, as a formula definition for such verbs as "to move," "to perceive," or "to communicate" (i.e., verbs describing abilities) is developed, those verbs which are illuminated (e.g., "to jump," "to see," or "to write") are both more range- and level-specific. However, verbs such as "to know" or "to appreciate", those which help to define the cognitive and affective domains, have concepts in their formula definitions which are not necessarily either more range- or level-specific. A different situation arises when cognitive and affective verbs are compared with those verbs which are part of their operational definitions (i.e., skill verbs). In this case, in comparison, the skill verbs may be said to be more range- and level-specific since they imply fewer instances and are closer to recordable exemplifications.

"Behavioralness." - The form of an educational objective may be described in regard to the behavioral or non-behavioral

nature of its verb. The two end points of the "behavioralness" continuum are state of being (non-behavioral) and action/movement (behavioral). This continuum is illustrated in Figure 5.

Figure 5. "Behavioralness" continuum.

An example of a verb that describes a state of being and which, therefore, falls toward that end of the "behavioralness" continuum is "to believe;" another is "to understand." All goals describe states of being, since the verb most appropriate for a goal (or attribute) is "to be." In addition, all verbs which describe cognitions (e.g., "to comprehend") or affects (e.g., "to believe") also describe states of being. Verbs which describe a mental or physical action are, for example, "to catch," "to visualize," "to apply," "to explain," or "to write." These all fall toward the behavior end of the "behavioralness" continuum.

The concept of operational clarity brings into focus the relationship between behavioral and non-behavioral verbs. That is, the operational definition of non-behavioral verbs (e.g., "to believe," "to understand") will consist of one or

more behavioral verbs (e.g., "to apply," "to give reasons," "to write").

Observability. - The last format category is called observability. This category refers primarily to a statement's verb, as does the "behavioralness" category. The two end points of the observability continuum are, of course, unobservable and observable. Figure 6 shows this continuum.

Unobservable Observable

Figure 6. Observability continuum.

Observability describes the degree to which one can directly assess the action or state of being described by a verb. The following concepts can be assessed directly: "to catch," "to give examples," "to write;" therefore, they are called observable. Those verbs like "to know," "to believe," "to comprehend," "to visualize," and "to apply" cannot be assessed directly since they do not represent observable behaviors; therefore, these are referred to as unobservable. It should be noted that a verb may be behavioral but not observable (e.g., "to apply" or "to visualize"), although the converse does not hold.

The concept of operational clarity also brings into focus the relationship between observable and unobservable verbs. That is, the operational definition of an unobservable verb (e.g., "to comprehend") consists of one or more observable verbs (e.g., "to give examples" or "to write").

It should be noted that some objects may be observable if they are level-specific (i.e., concrete). For example, "an oak tree," in relation to "botany" is not only more range- and level-specific but it is also an observable manifestation.

In summary, the concepts related to a statement's form are clarity, range, level of abstractness, "behavioralness," and observability. The format category clarity is the pivotal one. To achieve conceptual clarity, a formula definition for a verb or object must be developed. By making an object more range-specific, the components of its formula definition may be illuminated. The formula definition of some verbs may also be developed this way. Before a statement as a whole can be called conceptually clear, both its verb and object must be conceptually clear. The description of an object as abstract or concrete should be considered independently of its range character or its conceptual clarity.

To achieve operational clarity, an operational definition must be developed for a statement's verb. In order to make a verb operationally clear, it must be translated into more concrete, behavioral, and observable terms. An operationally clear statement has a verb which unambiguously describes an observable behavior in relation to a conceptually clear object. In addition, an operationally clear statement has a verb and object which are both range-specific (i.e., cover few or one instances).

Now that the form concepts related to a statement's verb and object have been discussed, next they will be used to describe paradigm statements of goals, intended learning outcomes, and behavioral evidence.

SECTION 3

PARADIGM STATEMENTS OF EDUCATIONAL OBJECTIVES

Goals

Ideally, in order to best communicate with those inside and outside the educational community and to best provide direction for the development of intended learning outcomes, goals should be conceptually clear. It should be remembered that in this study goals are defined as the attributes a pupil should possess upon completion of an educational experience. Conceptual clarity, however, is relative. It may best be determined by comparing related concepts. For the sake of argument, let us assume that these goal statements have objects that are not conceptually clear:

1. The pupil will be a self-actualized individual.
2. The pupil will be a life-long learner.
3. The pupil will be well-rounded.
4. The pupil will be a virtuous person.
5. The pupil will be adaptable.
6. The pupil will be a good citizen.
7. The pupil will be an expert in some field.

They may in fact be unclear since most people would agree that we are uncertain of their meaning. In this case, we may call such statements, as a whole, vague.

In order to gain conceptual clarity for each of these statements, a formula definition of their objects must be developed. A concept or term's formula definition is generated by specifying the essential components or properties of the concept. For example, the formula definition for the object of the goal "the pupil is a life-long learner" may include: self-motivated learner, curious, a knowledge seeker, responsive, skilled, independent, self-reliant, caring and involved. Each of these objects may be incorporated into a goal statement (e.g., "the pupil will be skilled", "the pupil will be self-reliant"). Such statements will help to conceptually clarify the goal "the pupil will be a life-long learner."

The process of conceptual clarification may continue indefinitely by developing a formula definition for each new statement. The educational planner must decide how range-specific and concrete he wants his goal statements to be. The more range- and level-specific they are, the more they circumscribe or precisely direct the selection of intended learning outcomes. For example, the goal "the pupil is skilled" may be seen by an educational planner as sufficiently clear to communicate his intents and to direct the selection of intended learnings. This statement has an object that is still moderately range-general since it covers many instances, though not as many as "life-long learner," the concept that includes it. "Skillfulness" is still quite abstract, since it is removed from particulars.

On the other hand, another educational planner might feel that it is necessary to make at least one more attempt at formula definition before he will be satisfied with the clarity of this goal. In that case, objects like these might be generated as part of the formula definition for "skilled": movement abilities, perceptual abilities, coordinated abilities, cognitive abilities, and complex abilities. Some of these may still be considered too vague by some planners.

Even more conceptually clear goals are developed by relating an attribute to some content area such as science. For example, "the pupil will seek knowledge in regard to basic scientific information," "the pupil will be skilled in the basic scientific cognitive abilities," or "the pupil will be self-motivated in regard to scientific learning." A formula definition for the attribute described in each goal and the content it is related to may be developed. This will produce more and more range-specific goals.

For our purposes, the above goals are conceptually clear enough. They communicate the attributes a pupil should have in relation to some content. The task of developing the intended learning outcomes needed to achieve these goals is next.

The primary differences between goals and intended learning outcomes lies in their definitions and language (i.e., form). As noted, a goal describes the attributes a

pupil should have at the completion of an educational experience; thus, the verb most often used in goals is "to be." The object of a goal will vary in form from vagueness to conceptual clarity and from range and level generality to moderate range and level specificity. The object of a goal may also describe somewhat observable behaviors (e.g., "the pupil will be skilled in hand-eye coordination").

Intended Learning Outcomes

Intended learning outcomes (hereafter abbreviated to i.l.o.) are, of course, defined as those learnings a pupil should accomplish as part of an educational experience. It is hoped that their accomplishment will enable the pupil to achieve the related goal(s) of the program. The language of an intended learning outcome (i.l.o.) differs from a goal's primarily in that the relevant domain of learning must be communicated by an i.l.o.'s verb.

Most authors agree that there are three domains of learning. However, there is little agreement, especially that which is based on empirical evidence, as to the exact nature of the members of those domains. Although Bloom (1956), Krathwohl (1964), and Harrow (1972) have exhaustively described three domains, there remains much overlap and conceptual confusion.

After carefully examining these three resources as well as others (e.g., Bloom, Hasting and Madeaus (1971)), an attempt was made to use the domains of learning they

suggest to generate statements of educational objectives. It became evident that they could and should be modified. In this study, the traditional names are retained for two of the domains of learning. The first is the cognitive domain. In this domain are those i.l.o.s with verbs which imply the acquisition of knowledge. Therefore, they are characterized by verbs which make up the formula definition for the verb "to know." These verbs are, for example, "to understand," "to be aware of," and "to comprehend," among others. The second traditional domain is the affective domain. In this domain are those i.l.o.s which imply the acquisition of feelings and attitudes and inclinations. Feelings or attitudes describe the degree of internalization or commitment the pupil is expected to have in regard to any particular content (Krathwohl, 1964). This commitment is expressed by verbs such as "to love," "to value," "to believe," "to be interested in," and "to cherish," among others. Inclination describes the commitment to act in relation to one's feelings toward some content. Verbs such as "to want to," "to desire to," "to be inclined to," and "to look forward to" are the kinds of verbs used to express inclination.

The third domain referred to in this study is a modification of the traditional psychomotor domain. It is called the skill domain. In this domain are those i.l.o.s with verbs which imply the acquisition of various abilities:

movement, perceptual, coordinated, cognitive, affective and complex. Some verbs associated with the various abilities are:

movement - to move, to jump, to gesture, to manipulate, to run, to catch, and to sway

perceptual - to perceive, to see, to hear, to smell, to touch, and to taste

coordinated - to coordinate (e.g., hand-eye, foot-eye)

cognition - to translate, to distinguish, to compute, to analyze, to apply, to solve problems, to recognize, and to synthesize

affective - to listen sympathetically, to question sincerely, to explain lovingly

complex - to sculpt, to teach, to write creatively, to practice medicine, to dress neatly

To illustrate the differences among statements that fall under each category of learning let us consider some examples.

Cognitions. - The goal "the pupil will be knowledgeable in regard to basic scientific information" directs the selection of cognitive intended learning outcomes which will help a student achieve this goal. First, this goal is translated into the language of intended learning outcomes: "the pupil knows basic scientific information." The verb and object of a cognitive i.l.o. should be at least conceptually clear in order to communicate the cognitions that a pupil should achieve and to direct the instructional planning process. A formula definition for the verb "to know" and the object "basic scientific information" must, therefore, be generated in order to conceptually clarify this i.l.o.

The components of the formula definition for "to know" include "to understand," "to be aware of," etc. The formula definition of "basic scientific information" includes the concepts, terms, laws, etc. of the natural, physical, social, and psychological sciences. By developing formula definitions for these content areas, more and more of their components and properties will be illuminated.

Each cognitive i.l.o. combines one of the components of "to know" with a component of a scientific content area. An example of a conceptually clear cognition is "the pupil understands the concept 'evolution'."

However, this i.l.o. may not be considered specific enough to guide instructional planning, although it is conceptually clear. In that case, an educational planner may develop a formula definition for the concept "evolution." The new components illuminated may not be any more conceptually clear, but they will be more range-specific since they are subsumed by "evolution." They will also be more level-specific since they are more closely related to particulars. Here are some examples of cognitive i.l.o.s with moderately range-specific objects related to "the pupil understands the concept 'evolution'": "The pupil understands the implications of natural selection," and "the pupil understands the reasons for mutations." "The pupil is aware that DNA stands for dioxyribonucleic acid" has a range- and level-specific object.

No matter how range- or level-specific a cognition's object becomes, since all cognitive verbs describe states of being, the statement as a whole may not be termed observable or behavioral.

Skills. - The goal "the pupil will be skilled in basic scientific abilities" directs the selection of skill i.l.o.s. Skill i.l.o.s may be divided into two groups, those that describe unobservable behaviors, and those that describe observable behaviors.

Those that describe perceptual abilities ("to see," "to hear," etc.), cognitive abilities ("to apply," "to recognize," "to analyze," "to synthesize," "to hypothesize"), and some affective abilities ("to listen sympathetically") are unobservable. The skill "the pupil is able to analyze basic scientific data" is a conceptually clear though range- and level-general statement which describes an unobservable behavior, since its verb "to analyze" describes an unobservable behavior and both its verb and object are range- and level-general. The verb "to analyze" is retained throughout the development of the formula definition of "basic scientific data." This will produce statements like these that have more range- and level-specific objects: "the pupil can analyze weather conditions," "the pupil can analyze the chemical makeup of substances," "the pupil can analyze the raw input from an experiment," "the pupil can analyze a flow chart."

Skill i.l.o.s with very range-specific objects related to "the pupil can analyze weather conditions" might be "the pupil can analyze cloud formations, barometric pressure, humidity, etc."

The skill i.l.o. "the pupil is able to manipulate scientific equipment" describes a moderately range- and level-general, observable behavior in relation to a moderately range- and level-general object. By providing a formula definition for the verb "to manipulate" and the object "scientific equipment," i.l.o.s with more range- and level-specific verbs and objects are produced. It should be noted that this i.l.o. is also operational since it describes an observable behavior. As both its verb and object are made more range-specific, the statement as a whole becomes operationally clear: "the pupil can draw out liquid using a pipette."

Affects. - The goal "the pupil will be self-motivated in regard to basic scientific learning" directs the selection of affective i.l.o.s such as these: "the pupil values the scientific method of inquiry," "the pupil is interested in scientific knowledge," and "the pupil is inclined to use scientific skills." The verbs used in these i.l.o.s ("to value," "to be interested in," and "to be inclined to") all describe states of being as do goals ("to be") and cognitions ("to know").

Like cognitions, once the verb and object of an affect have been made conceptually clear through formula definition

(e.g., "the pupil looks forward to scientific experiments"), then the object may be made as range- and level-specific as the educational planner wants it to be in order to direct instructional and evaluation planning.

In summary, cognitive and affective i.l.o.s should be conceptually clear to best direct instructional and evaluation planning. Once this is attained, a statement may be made as range- and/or level-specific as the content (i.e., its object) warrants. No matter how level- and/or range-specific a cognition or affect becomes, it will still describe a state of being.

Skills, on the other hand, by the nature of their verbs, describe behaviors. Some describe unobservable behaviors and others describe observable behaviors. Again it is up to the discretion of the educational planner to pursue range- and level-specificity. Those statements describing observable behaviors that are made very specific may also be termed operationally clear.

Behavioral Evidence

The primary differences among behavioral evidence and goals and i.l.o.s lie in their definition and language (i.e., form). Behavioral evidence is defined as a statement which describes what one should look for in order to assess the achievement of goals or intended learning outcomes.

The essential form characteristic of statements of behavioral evidence is that they contribute to or manifest

operational clarity. Operational clarity is defined as characterizing a statement which unambiguously describes an observable behavior. Depending on the degree of operational clarity attributable to a statement for which behavioral evidence is to be generated, a varying number of intermediate statements must be developed before operational clarity is achieved.

Let us first consider those statements farthest removed from operational clarity, that is, those objectives whose verbs describe a state of being. The following serve as examples: "the pupil will be a good citizen," "the pupil will be a life-long learner," "the pupil will be a self-actualized individual," "the pupil is interested in scientific knowledge," or "the pupil knows basic scientific information." In order to operationally clarify such statements (i.e., translate them into observable behaviors), three types of behavioral evidence are created. First, criteria are developed which conceptually clarify and/or begin the process of operational definition in regard to the verb and object of a statement. Next, for each criterion, indicators are generated. These indicators describe observable behaviors. Finally, data, the most operationally clear statements of behavioral evidence, are developed for each indicator.

Criteria. - The first type of behavioral evidence generated in relation to statements which describe states of being is called criteria. The term criteria is used

because it implies a general standard of judgment. Criteria may describe conceptually clear states of being, unobservable behaviors, or observable behaviors. In this study, those behavioral evidence statements which describe states of being are called general criteria. Some general criteria related to the goal "the pupil will be a good citizen" are as follows: "the pupil comprehends the significance of the Declaration of Independence," "the pupil values the basic tenets of democracy," "the pupil is aware of current issues," "the pupil knows how to fill out his income tax form," and "the pupil understands the implications of free speech." Specific criteria describe behaviors and may be either observable or unobservable. They may be formulated in relation to a goal, intended learning outcome, or general criteria. Specific criteria are the next step toward operational clarity since they are statements that describe actual behaviors related to states of being.

The reader may have noted that general criteria have the same form as cognitive and affective i.l.o.s. The difference between a general criterion and an i.l.o. lies in its input function. For i.l.o.s, this function is to guide the instructional planning system, while for criteria, it is to guide evaluation planning. That is, a statement such as "the pupil values the basic tenets of democracy" may be considered either a general criterion of behavioral evidence or an intended learning outcome. If the statement

is to function as an i.l.o., its verb and object need only be made conceptually clear enough to guide instructional planning. However, if the statement is to function as a criterion, not only must its verb and object be conceptually clear but the statement as a whole must become operationally clear.

Specific criteria have the same form as skill i.l.o.s. Specific/behavioral criteria include perceptual, cognitive, affective perceptual, and some complex abilities in that these abilities are behaviors but not observable (e.g., "the pupil can apply the basic tenets of democracy" or "the pupil listens with empathy to a speech by someone with a different point of view from his own."). Specific/operational criteria include movement, communication, affective response and some complex abilities since these abilities are observable behaviors (e.g., "the pupil states the implications of a high unemployment rate" or "the pupil actively works for community development.").

Indicators. - The term "indicator" is chosen to describe the next type of behavioral evidence. The term implies a statement whose function is to identify characteristic behaviors relative to more general statements of behavioral evidence. In relation to specific/behavioral criteria, an indicator's task is to provide logically related, observable and, therefore, operational statements. This is accomplished by using verbs which describe observable behaviors. For example, an indicator for the specific/behavioral criterion

"the pupil can apply the concept of equal justice under law" might be "the pupil demonstrates as a judge, decisions based solely on the merits of a case." It should be noted that not only has the verb now become observable, but the object is also more range- and level-specific. Indicators for specific/operational criteria need only to continue the process of operational clarification by providing more range- and level-specific verbs and objects, since these statements already have verbs which describe observable behaviors.

Data. - Data is the name given to statements which are the most operationally clear behavioral evidence. For each indicator, one or more data statements is developed in order to complete its operational definition. Data statements are both range- and level-specific in both verb and object, and in addition, describe observable behaviors. "The student gives reasons for his rendering a particular judgment" or "the student votes" are examples of data statements.

The development of conceptually clear statements of behavioral evidence is requisite to the development of operationally clear statements. There is always the risk of developing operational definitions that do not provide valid data relative to the objective in question. In order to reduce this risk, one should not attempt to take the conceptual leap from vague statements of educational objectives to operationally clear statements without first attaining conceptual clarity.

In addition, it is worth reinterating that the operational definition of all but the most specific and already operational objectives should include a wide variety of behavioral evidence. In this way it may be assured that the wealth of individual behaviors or exemplifications implied by an objective are tested for, and in so doing, the accomplishment of that objective's intent will be more accurately assessed.

SECTION 4

CONCLUSIONS AND IMPLICATIONS

In conclusion, there are three contributions that this study makes to the literature on educational objectives. Each has its own implications.

The first contribution is to modify the traditional notion of a statement's function. This modification consists of redefining a statement's function as communication and direction. The major implication of such a change lies in the fact that it is congruent with a process/product model of educational development, that is, a model in which different educational products (e.g., objectives) have particular functions (e.g., communication and direction) relative to various developmental processes (e.g., curriculum development, instructional planning, and evaluation planning). Such a model divorces the development of educational objectives from planning level contexts. In other words, the model may be used in any context (e.g., the national level, school district or university level, or classroom level).

It is important to note that this process/product model leaves the decision as to the precise form of ~~an~~ objective

largely to the educational planner in each context. By doing this it allows the educational planner to be as prescriptive as he desires. For example, if the planner wishes to give maximum freedom to those who are going to develop instructional and evaluation plans from his objectives, then he should make sure those objectives are of a most general sort. That is, they should be statements which have verbs describing vague states of being and which, as a whole, are range- and level-general. On the other hand, if the planner wishes to circumscribe the subsequent instructional and evaluation plans as much as possible, he may formulate objectives which are characterized by conceptually clear, if not operationally clear, verbs as well as verbs and objects which are range- and level-specific.

This brings us to the second contribution that this study makes, namely, that it represents an evolutionary step in the discussion of a statement's form. As Langley (1974) notes, previously the form of an educational objective has been discussed in reference to the whole statement, using rather gross terms such as "general" and "specific" in a behavioral sense. Strike and Posner (1974) present four format categories which allow for a much more detailed explication of a statement's form. In this study, the assumption is made that these format categories may be modified somewhat and used to discuss a statement's verb and object separately since the verb and object may not have the same characteristics at the same time. The benefit

of this is that educational planners and researchers now have a precise set of concepts with which to analyze and construct statements of educational objectives. In addition, these concepts are based on a moderate empiricist point of view and as such are non-prescriptive. However, they do provide a framework with which to differentiate between goals, intended learning outcomes, and behavioral evidence.

The paradigm statements cited are the third and perhaps the most important contribution this study makes to the literature on educational objectives. Statements which exemplify the concepts in each of the format categories used in this study were given by way of illustrating the three kinds of educational objectives.

Simply defining these three kinds of objectives (goals, intended learning outcomes, and behavioral evidence) in a precise way has definite implications. Of course, Johnson (1967) and Strike and Posner (1974) had previously defined intended learning outcomes and behavioral evidence. However, the addition of a unique definition for educational goals means that planners and researchers will be able to generate statements which represent the most commonly used educational objectives with confidence that they do, in fact, describe different kinds of statements. In addition, since the definitions of these objectives are based on a moderate empiricist ideology which has been well described, the educational planner or researcher can be sure that his work has a sound philosophical underpinning.

The paradigm statements themselves which were generated relative to the stipulated definitions of the objectives in this study also offer much to the literature. First, they illustrate the distinguishing characteristics of each kind of objective. For example, because of their definition, goals will predominately use the verb "to be." As the paradigm statements show, a goal's object may vary in form from a vague, range- and level-general state of being to a conceptually clear, range- and level-specific observable behavior. On the other hand, with i.l.o.s and behavioral evidence, the behavioralness and observability of the statement as a whole is determined by their verb's form characteristics. This is true even though a statement's object may be level-specific (i.e., a particular or concrete) and, therefore, observable.

Another way that the paradigm statements help to illustrate the differences among objectives is in regard to the form characteristics recommended for each type of statement. These are not prescriptions, but simply recommendations with just two exceptions. The first is the appropriateness of the verb "to be" in goal statements in light of their stipulated definition. The use of this verb means that goals, by and large, may be characterized as states of being. However, there are no prescriptions as to the desired form that a goal statement should take in order to carry out its functions of communication and direction. The only recommendation is that the more one

wishes to circumscribe subsequ nt development, the more level- and range-specific one's goals should be.

Of course, a case can be made for, at least, conceptual clarity of goals. It may be argued that if one's goals are not conceptually clear (i.e., if one does not know what they mean) then it will be impossible to decide how to achieve them or how to determine if they have been achieved. A similar argument may be made for having conceptually clear intended learning outcomes. That is, if one does not clearly define the objectives of instructional planning, then it will be at best difficult to develop clear and effective plans. Further, it will be difficult to evaluate the effectiveness of those plans. Beyond this, there are no recommendations that an i.l.o. be level- or range-specific or that it describe an observable behavior rather than unobservable ones or a state of being. In fact, it has been shown that those characteristics, in the case of i.l.o.s, are determined solely by their domain and kind of learning.

The only other prescription made by this study, which is simply a reiteration of Strike and Posner's argument, is that statements of behavioral evidence should be formed so as to contribute to or manifest operational clarity. That is, behavioral evidence must be conceptually clear, and in the case of data statements, they must unambiguously describe observable behaviors.

The paradigm statements themselves may be used as a reference when one is analyzing or constructing a set of

educational objectives, since they graphically present the format category concepts. It is hoped that this study makes a contribution to the development of theory concerning educational objectives and to the practical task of formulating them.

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